CHAPTER VII.—DESCRIPTIONS OF PROPERTIES

The mining properties of the Antler Creek area are described in alphabetical order, using the name most firmly established for a property rather than a company name. In some instances, consolidations of well-known properties or groups have resulted in the use of more than one name for a property.

Figure 15 shows surveyed claims in the northern part of the area, grouped according to ownership. It includes all Crown-granted and most recorded claims held in the map-area in January, 1955. Important underground workings are shown and are numbered in sequence from northwest to southeast. These numbers also appear on the geological map (see Fig. 2) and in square brackets under the heading of the property description.

A check-list of names and lot numbers of mineral claims shown on Figure 15 forms Appendix C.

Aurum.—See Island Mountain [1].

Canusa

Canusa Mines Ltd. (name changed from Canusa Cariboo Gold Mines Ltd. in August, 1956) holds two Crown-granted claims and twenty-four recorded claims and fractions stretching up Cow Mountain from Lowhee Creek and Stouts Gulch. The property is adjacent to the southern end of the Cariboo Gold Quartz property. The mine buildings and shaft are at the head of Stouts Gulch and about 2,000 feet south of the B.C. shaft of the Cariboo Gold Quartz mine. The underground workings consist of a 300-foot two-compartment vertical shaft, from which extend a 350-foot crosscut and 600 feet of drift.

The Canusa vein is not naturally exposed at surface, and most of the smaller veins were deeply covered by overburden until hydraulic mining exposed them in the 1930's. The ground was located as the Blue Jay group in the 1930's and a moderate amount of prospecting done, including the driving of a short adit by Cariboo Central Gold Mines Ltd. south of the Black Bull vein, but no extensive work was done until the present company was formed. In 1946 the shaft was sunk; the Canusa vein was discovered in 1947 and explored the following year. The mine was shut down and allowed to flood at the end of August, 1948.

Bedrock is generally mantled by drift in the vicinity of the mine, except in the hydraulic pits on Lowhee Creek and Stouts Gulch. The rocks exposed in these are dominantly brown-weathering grey micaceous quartzite, commonly with dark or opalescent quartz grains. The average grain size ranges from that of granule to silt. The mine dump is composed of similar rocks which are not yet weathered brown. Lesser amounts of grey to brown phyllite, a few small limestone beds, and one schistose greenstone dyke occur. All rocks are typical of the lower part of the Snowshoe formation. Black argillite of the Midas formation flanks the outcrop belt of the Snowshoe formation on both sides of the valley, along the Lowhee ditch on the southwest, and adjacent to the B.C. vein on the northeast. Outcrops are too few to show the precise contacts.

The general structure is a tight syncline of Snowshoe rocks flanked by anticlines of Midas rocks, the lesser one being that on the northeast (see Fig. 17). The structural interpretation is based primarily on stratigraphy, but confirmation can be obtained on lower Stouts Gulch from cleavage-bedding relations and small dragfolds. Evidence of the anticlinal nature of the area of Midas formation in which the B.C. vein occurs is found on the 1500 level of the Cariboo Gold Quartz mine. Bedding and cleavage strike between north 40 to 60 degrees west and dip between 35 and 70 degrees to the northeast. Northwest of the shaft the folds plunge to the northwest at 10 to 15 degrees, but southeast of the shaft the folds plunge as much as 15 degrees to the southeast. This is one of the few major reversals in plunge in the map-area.

There are no major faults, but two northerly striking faults of moderate displacement are adjacent to the mine. The Waoming fault, with a horizontal separation of possibly a few hundred feet, is about 700 feet east of the end of the east drift. The B.C. fault, with a horizontal separation of just over 100 feet, cuts the northeast end of the B.C.
vein, and its projection would pass within 700 feet of the northwest drift. Small faults that cut the Canusa vein all displace the vein less than 16 feet.

The main surface showings consist of two groups of veins, small transverse quartz veins mostly south of the shaft, and strike veins in the upper end of the Lowhee pit. All the small veins near the shaft strike approximately north 20 degrees east and dip steeply west, except one which strikes in the diagonal direction, approximately north 70 degrees east. The veins are all narrower than 18 inches, and the longest is about 75 feet long. These veins are vertically above the main Canusa vein and their relation to it is unknown. The Minister of Mines Annual Report for 1945 (p. 81) quotes assays of pyritic concentrations in these veins that yielded as much as 0.14 ounce of gold per ton, and of thin replacements adjacent to the veins with as much as 0.70 ounce of gold per ton.

The main vein in the upper part of the Lowhee pit, called the Black Bull vein, is about 900 feet southwest of the B.C. vein and about 2,000 feet northwest of the Canusa shaft. The Black Bull vein, like the B.C. and Canusa, is a strike vein. The main part of it is 210 feet long, but vein matter extends discontinuously for another 600 feet to the northwest from the main part. It is 12 feet wide at the widest part at the southeast end, where it terminates abruptly without faulting. The vein appears barren because much of the pyrite is leached, but pyrite concentrations have yielded assays of 0.14 and 0.32 ounce of gold per ton. Similar but smaller subparallel veins occur near the northwestern extension of the vein. Gold is reported to have been panned from the quartz of these veins, but there is no assurance that it was placer gold.

The mine workings are now flooded but have been examined by Holland (Minister of Mines, B.C., Ann. Rept., 1948, pp. 87–90). The following is quoted with minor revisions from his report:

The underground workings on the 260-foot level from the shaft comprise some 950 feet of crosscutting and drifting. The crosscut is driven south 27 degrees west for 350 feet. For 150 feet the crosscut intersects medium- and dark-grey (phyllite and micaceous quartzite). The next 145 feet consists of light-grey to white quartzite with thin argillaceous layers, grey ankeritic carbonate layers, and thin beds of rice-grained quartzite. For the last 55 feet to the face the rocks are grey argillaceous schist and dark-grey and black slate, with the black slate at the face. They are considered to belong to the (Midas formation). The rocks strike north 65 degrees east to north 75 degrees west and dip 35 to 60 degrees northward.

At 175 feet south of the shaft the crosscut intersects the Canusa vein, which ranges from about 9½ to 11 feet wide, dips northward at about 65 degrees, and strikes about north 60 degrees west. The vein is drifted for 200 feet south-east of the crosscut and for 390 feet north-west.

The vein is cut by ten faults having lateral displacements of from 1 to 3 feet and by two with displacements of 12 and 16 feet. Their direction of movement is not constant, nor do they fall into a definite pattern. They strike north-east or north-west and have variable dips. The quartz in some places is fractured at right angles to the strike of the vein and in others is crossed by a network of younger quartz-filled fractures. It is mineralized rather sparingly with pyrite and contains galena, some sphalerite, cosalite, and occasionally some visible gold. The vein was systematically sampled at 10-foot intervals by the company in July, 1948. The numerical average of forty-nine samples is 0.17 oz. gold per ton, thirty samples assayed less than 0.11 oz. per ton, nine lay between 0.11 and 0.2 oz. per ton, two lay between 0.2 and 0.3 oz. per ton, four between 0.31 and 0.4 oz. per ton, and four assayed more than 0.5 oz. per ton. There is an indication that the better than average assays usually come from sections where the vein is shattered near a crosscutting fault. However, the best assays were from samples containing cosalite taken 50 feet from the nearest fault. One selected sample, well mineralized with pyrite, taken by the writer near the fault 25 feet south-east of the crosscut, assayed 0.18 oz. of gold per ton. Another selected sample well mineralized with pyrite and cosalite from the stringer on the east wall of the crosscut 70 feet south of the Canusa vein also assayed 0.18 oz. of gold per ton.

The last work on the Canusa vein was the continued driving of the north-westerly drift toward the southward projection of the B.C. fault. The fault was expected to be 100 to 300 feet north-west of the crosscut, but at 390 feet still had not been encountered. The B.C. fault is of interest because of the hypothesis that better values might be expected in the Canusa vein in the shattered zone on either side of the fault in a similar situation to that at the surface on the Cariboo Gold Quartz Mining Company's ground where the B.C. vein contains a 75-foot ore-
shoot on each side of the B.C. fault, and on 1500 level where the B.C. vein had an ore-shoot (now stope) on the south-east side of the B.C. fault. Consequently there is good reason to expect that the Canusa vein, because of its size and because it contains appreciable though sub-marginal gold values, will contain ore-shoots under similar favourable structural circumstances.


The Cariboo Coronada property consisted of a group of recorded claims on the south side of Mount Cornish and was developed by two adits in 1933-34, but the claims have since lapsed and the company, Cariboo Coronada Gold Mines Limited, is without equity. The main adit is one-half mile north of Wells at the base of Mount Cornish. It is now caved at the portal. The adit is reported to have been driven north 13 degrees west for more than 1,300 feet but did not reach its objective, which was the downward projection of a group of veins on Mount Cornish 700 feet in elevation above the portal. The veins on the surface are northerly to transverse in strike, and one is reported to be 8 feet wide.

The rocks on the property are very poorly exposed phyllite, metasiltstone, limestone, and some quartzite of the Snowshoe formation. The adit is near the axis of the Snowshoe synclinorium.


The Cariboo Gold Quartz Mining Company Limited owns 102 Crown-granted claims and fractions in an unbroken block 2 miles wide and 4 miles long extending from Mosquito Creek to Stouts Gulch. The property includes the Island Mountain mine, which was purchased in 1954 and is treated separately in this chapter. The following description deals only with the holdings owned prior to 1954 and does not include the Westport group of a subsidiary company, Williams Creek Gold Quartz Mining Co. Limited. The property, thus restricted, surrounds the Island Mountain mine on three sides and includes the townsite of Wells. The Cariboo Gold Quartz mine workings extend southeasterly from Jack of Clubs Lake through Cow Mountain to the B.C. vein at the head of Lowhee Creek, a distance of 2 miles.

Gold-bearing quartz veins on what is now Cariboo Gold Quartz property have been examined repeatedly since the 1870's. Most of the early work was done on the B.C. (Bonanza) vein, but some was done on the Pinkerton and Enterprise veins (both on the Pinkerton claim, Lot 356). B.C. Mining and Milling Company brought a 20-stamp mill to the B.C. vein in 1878 but did not erect it. In the next ten years this company sank an inclined shaft in the vein approximately 150 feet, drove a few hundred feet of drift, and did some drilling but mined little ore. During the same period the Victoria Company did some underground exploration on the Pinkerton and Enterprise veins, sinking a 150-foot shaft on the former. From the 1880's little was done until the early 1920's, when A. W. Sanders located the Rainbow group. He did much surface work and mined the weathered, enriched surficial part of several veins.

The Cariboo Gold Quartz Mining Company Limited was formed in 1927 by Fred M. Wells and acquired the Pinkerton claim and the Rainbow group. Thereafter, other claims were located or purchased, so that by 1932 the company held most of its present property except the Island Mountain (Aurum).

In 1927 an adit was driven at 4,375 feet elevation toward the downward projection of showings on the Rainbow claim at approximately 4,800 feet (now the Sanders zone of the mine). Several veins were encountered, but the adit was abandoned in 1930 before the main objective was reached. In 1931 an adit (the 1500 level) was driven at approximately 4,000 feet elevation from a portal about 100 feet above Jack of Clubs Lake. The hope that mineable veins would be encountered en route to the same objective was fulfilled, and a mill was brought into production in January, 1933. The initial capacity of
50 tons per day was increased in several stages to 350 tons per day by 1940. Mine development proceeded rapidly in this period, mainly from the 1500 level. By 1942 four shafts had been sunk and the 1500 level extended over 2 miles to meet the B.C. shaft. Total production of the mine to the end of 1953 has been 1,407,354 tons of ore, from which 520,235 ounces of gold and 45,046 ounces of silver have been recovered. To January 31, 1954, the mine has produced $19,123,980, of which $1,679,976 has been returned as dividends. Production in 1953 totalled 65,214 tons, from which 26,140 ounces of gold and 2,331 ounces of silver were recovered.

The mine workings are extensive, totalling more than 25 miles. The portal of the 1500 level [3] is situated on the Telluride (Lot 7798) at the northeast end of Jack of Clubs Lake directly opposite the Island Mountain 4000 level portal. The 1500 level extends southeastward for over 2 miles to the inclined shaft on the B.C. vein [4]. There are two higher adit levels on Cow Mountain, the 1200 and 1000 levels. Veins are concentrated in the Snowshoe micaceous quartzite (Rainbow member) close to northerly striking faults which are spaced at approximately 1,000-foot intervals. The ore zones are thus isolated from one another, and each has been developed above and below the 1500 level with relatively few interconnecting levels. The level interval is 110 feet. The ore zones are named from northwest to southeast: Tailings (below Jack of Clubs Lake), No. 1 (at the 1500 level portal), Rainbow, Sanders, Pinkerton, Butts, Goldfinch, and B.C. Vertical shafts extend downward from the 1500 level in the No. 1 zone (to the 2000 level), Rainbow, and Sanders zones (both to the 1900 level); an inclined shaft extends in the B.C. zone from surface to the 1500 level; and raises extend upward from the 1500 level to higher adit and internal levels in the Rainbow, Sanders, Pinkerton, and Butts zones. The shaft in the Sanders zone is no longer used, and servicing is chiefly carried out by the three-compartment shaft in the No. 1 zone. Ore from the Island Mountain mine is hoisted at that mine and trucked to the Cariboo Gold Quartz mill.

The structure and stratigraphy at the Cariboo Gold Quartz mine cannot be discussed without reference to the description of Island Mountain mine (pp. 82-85) or to the outline of the fold structures of the Wells camp (p. 53). The workings of the two mines, Figure 16, are almost directly in line along strike, and information gathered from one mine complements that from the other.

The following description of the stratigraphy and structure must unfortunately be complicated by reference to earlier work. In the mine, Hanson (1935, pp. 22-23) mapped four subdivisions of the Rainbow member that in his text were named divisions 2a, 2, 3, and 4 from southwest to northeast; all dipped at 45 degrees to the northeast and faced in the same direction. The approximate equivalence of these divisions to the sections described by the writer is shown in the tables on page 76.

Subsequent writers (Richards, 1948, p. 163; Skerl, 1948b, pp. 574-578) have used Hanson's subdivisions but have revised the order of numbering: Hanson's uppermost unit, No. 4 division, now being called No. 1 band; his No. 3 division now being called No. 2 band, etc. Following Benedict's demonstration of a large overturned drag-fold at Island Mountain mine, geologists concerned with the problem considered Hanson's section "upside down." Thus Skerl (1948b, p. 576) lists as oldest to youngest the Baker, Rainbow, Lowhee, and B.C. members. Skerl mentions Hanson's divisions but lists them in reverse order without comment. He states (p. 576) that Nos. 1 and 3 bands (Nos. 4 and 2 divisions of Hanson) are alike, that Nos. 2 and 4 bands are light coloured, and arbitrarily that No. 4 band is Lowhee member. No. 2 band, he believes, results from infolds of two different members. He states:

The so-called No. 2 band appears to be in part a large elongated infold of the Baker horizon in No. 3 zone (Sanders ore zone) and in part a similar fold of the Lowhee horizon in No. 1 and No. 2 (Rainbow) zones.

Hanson apparently used colour as one of the bases of his subdivisions but did not say so. Skerl recognized that some rocks were bleached (p. 576), but he also used
colour as a guide in mapping. The writer has found colour an unreliable guide in the vicinity of Wells, where bleaching is pronounced and widespread.

The Cariboo Gold Quartz mine workings are in the Snowshoe and Midas formations. Foliation strikes northwestern and dips about 45 degrees northeastern; bedding is not normally distinguishable. The following tables present in simplified form the sections exposed in two continuous crosscuts on the 1500 level; the first extends along the 201 crosscut, from the portal, and the second along the 241 North and South crosscuts, 2,400 feet southeast of the portal (see Fig. 16). Thicknesses are measured normal to the foliation (without regard to possible duplication by folding). Between the Midas formation and the Baker limestone beds six members are recognized, and are lettered a to f. The sequence has only local significance because the units are duplicated by the Sanders isoclinal syncline. The position of the axial plane cannot be determined and the syncline cannot be seen directly (see p. 53).

### 201 CROSSCUT

<table>
<thead>
<tr>
<th>Regional Units</th>
<th>Subdivision</th>
<th>Thickness in Feet</th>
<th>Lithology</th>
<th>Hanson's Units</th>
<th>Mine Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker limestone beds</td>
<td>f</td>
<td>57</td>
<td>Grey micaceous quartzite.</td>
<td>No. 4 division</td>
<td>No. 1 band</td>
</tr>
<tr>
<td></td>
<td>e</td>
<td>42</td>
<td>Grey phyllite with quartzite lenticles.</td>
<td>No. 3 division</td>
<td>No. 2 band</td>
</tr>
<tr>
<td></td>
<td>d</td>
<td>78</td>
<td>Bleached phyllite, minor quartzite.</td>
<td>No. 2 division</td>
<td>No. 3 band</td>
</tr>
<tr>
<td></td>
<td>c</td>
<td>110</td>
<td>Grey micaceous quartzite.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>26</td>
<td>Grey phyllite with quartzite lenticles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>50</td>
<td>Grey phyllite and quartzite.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snowshoe formation</td>
<td></td>
<td>200</td>
<td>Black argillite and phyllite, some bleached.</td>
<td>B.C. member</td>
<td>No. 4 band (Lowerhec) and B.C. member</td>
</tr>
</tbody>
</table>

### 241 NORTH AND SOUTH CROSSCUTS

<table>
<thead>
<tr>
<th>Regional Units</th>
<th>Subdivision</th>
<th>Thickness in Feet</th>
<th>Lithology</th>
<th>Hanson's Units</th>
<th>Mine Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker limestone beds</td>
<td>f</td>
<td>56</td>
<td>Grey quartzite and phyllite, some bleached.</td>
<td>No. 4 division</td>
<td>No. 1 band</td>
</tr>
<tr>
<td></td>
<td>e</td>
<td>100</td>
<td>Grey phyllite with quartzite lenticles.</td>
<td>No. 3 division</td>
<td>No. 2 band</td>
</tr>
<tr>
<td></td>
<td>d</td>
<td>44</td>
<td>Grey quartzite, some bleached.</td>
<td>No. 2 division</td>
<td>No. 3 band</td>
</tr>
<tr>
<td></td>
<td>c</td>
<td>57</td>
<td>Grey micaceous quartzite.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>15</td>
<td>Grey phyllite with quartzite lenticles.</td>
<td>No. 2 division</td>
<td>No. 3 band</td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>55</td>
<td>Grey phyllite and quartzite.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snowshoe formation</td>
<td></td>
<td>42</td>
<td>Bleached fawn-coloured phyllite.</td>
<td>No. 2a division</td>
<td>No. 4 band (Lowerhec)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>63</td>
<td>Bleached greenish phyllite.</td>
<td>B.C. member</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>210</td>
<td>Black argillite, some bleached.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparison of the 201 and 241 sections shows general similarity but some differences in thickness and lithology. The thickness of the units varies between sections, partly because of small-scale duplication by folding and partly because of attenuation. The lithology varies because of lenticularity of units and because of bleaching.

The phyllite with quartzite lenticles forming units b and e requires special mention. This rock may contain varied proportions of quartzite lenticles, which may be of varied sizes up to 5 feet long (see Fig. 18). The streamlined shape and arrangement of the lenticles preclude a sedimentary origin. The rock has obviously been intensely deformed, and the writer agrees with Skerl (1948b, p. 576) that this rock is the result of great
attenuation. Figure 18 illustrates a small-scale occurrence of this rock on one limb of a torn syncline.

Bleaching of Snowshoe and Midas rocks is important. However, the proof of bleaching is not obvious except on the fringes of bleached areas. In fringe areas, bleaching is proved by patchy distribution, particularly along the line of plunge, kernels of unbleached rocks within bleached rocks, and penetration of bleaching along cleavage and AC joints into unbleached rocks. Bleaching is most intense near large northerly faults and extends from them along the regional foliation in the form of serrated wedges.

Bleached rocks range in colour from fawn to silver to light green, depending on small differences in the relative abundance of muscovite, chlorite, and ankerite. Bleached rocks commonly contain veinlets of red-weathering, clear cherty quartz that are parallel to the foliation or the AC joints. It is not clear whether this quartz was introduced into or derived from the bleached rocks.

Some vague forms in the fringe areas of mixed bleached and unbleached rocks may sometimes be taken for dragfolds. Most of them have no continuity along plunge and are undeterminable; some possibly are relics of folding, much modified by bleaching. Skerl (1948b, p. 597) illustrates a section of drill core and of a crosscut wall showing jagged interpenetration of dark and light argillite which he calls dragfolding. The writer would interpret such a feature as penetration of bleaching into dark argillite.

The main fold structure of the Wells mining camp is the Sanders attenuated isoclinal syncline, which is one of a series of folds lying between the Island Mountain anticlinorium to the southwest and the Snowshoe synclinorium to the northeast. The syncline trends northwestward through the centre of the mine and, in common with all in the area, is overturned to the southwest. Evidence of the existence of the syncline can be found, but the fold itself has not been recognized. Discussion of the Sanders syncline is found on page 53.

In the mine small dragfolds in the Midas formation (see Fig. 16) all indicate a syncline to the northeast. In the Baker limestone beds small dragfolds mostly indicate a syncline toward the southwest. The dragfolds in the Midas formation are not as tight as those in the Snowshoe, but in the vicinity of the mine the Midas formation is homogeneous and has acted as a massive structural unit so that dragging has not been extreme. The Sanders syncline must lie between the Midas formation and Baker limestone beds. The axial plane probably lies within unit d or e, but, because the actual fold cannot be detected, its exact position is not known and the extent of duplication of and the precise
relations between units a to f are not known. Because of original lenticularity and subsequent attenuation, the two limbs would not be expected to be lithologically identical.

The minor folds within the mine plunge northwestward at 15 to 25 degrees, except in the vicinity of large northerly faults, where they are dragged so that the plunge is reduced, eliminated, or reversed. The net effect is to reduce the over-all plunge.

Faults in the mine are numerous. The most important are the northerly striking, easterly dipping faults, which are spaced roughly 1,000 feet apart. These are named, from northwest to southeast, Tailings, No. 1, Rainbow, Sanders, Lowhee, Goldfinch, and B.C. The Lowhee and Rainbow and possibly the Goldfinch are considerably larger than the other faults. The Lowhee fault dips 70 degrees east and has a right-hand horizontal separation of about 1,400 feet. It is essentially a normal fault, as is shown by considerable dragging of the plunge; its vertical component is unknown but is certainly large. In the vicinity of the mine workings the Lowhee fault has one important fault splaying from it, the Lowhee split, which branches from the main fault about 500 feet south of the main haulageway. The Rainbow fault dips 50 to 60 degrees to the east, and has a right-hand horizontal separation of 300 to 400 feet. It is also essentially a normal fault with a vertical component at least as great as the horizontal. The other faults are smaller and have the following horizontal separations: 100 feet on the No. 1, 20 feet on the Sanders, and 150 feet on the B.C. In general the smaller faults have flatter dips than the Lowhee and Rainbow faults.

The foliation is deflected and the plunge flattened within 200 feet of the Lowhee and 100 feet of the Rainbow fault. The foliation is deflected from north 75 degrees west to north 45 degrees west, and the plunge from an average of 22 degrees northwestward to horizontal.

Minor faults in the mine include easterly striking faults and "bedded" faults. The easterly faults are related to the northerly faults, against which they abut. They dip steeply southward and have very small left-hand horizontal separations. They are commonly filled with diagonal veins. The bedded faults strike northwestward and dip subparallel to the foliation. They commonly follow phyllitic beds, and some are marked by a foot of contorted and crushed phyllite. The faults have a moderate left-hand separation caused by the upper plate moving down plunge. Such faults appear to be most numerous where the plunge of folds is high. Figure 19 shows a bedded fault and its relation to the Rainbow fault.

The relation of veins to faults in the Cariboo Gold Quartz mine is most marked. The known veins are concentrated within 250 feet horizontally of the northerly striking faults. Diagonal veins are most numerous adjacent to the larger faults. Skerl (1948b, p. 585) states that veins are commonly wider and richer adjacent to the bedded faults. Vein matter has been deposited in the northerly faults and crushed by later movement. Veins on opposite walls of faults cannot be matched, proving that the faults existed prior to mineralization but were subject to later movement. So close a spatial relationship leads to the idea that the faults have served as conduits for the mineralization.

Veins of all types occur within the Cariboo Gold Quartz mine. Transverse veins are by far the most abundant and supply 60 to 75 per cent of the quartz ore. Diagonal veins are the next most abundant and supply most of the remaining quartz ore. The other types of veins are comparatively rare, but have been mined. The principal strike vein is the B.C. vein.

Transverse and diagonal veins commonly form a matted cluster. Figure 19 shows two typical vein combinations: one in which transverse veins splay from a dominantly diagonal vein, and one in which there is a complex interweaving between transverse and diagonal directions. These relations occur on dip as well as strike.

The veins normally occur in one type of rock and diminish at its boundaries. Thus the vein clusters slope northeastward with the dip of the enclosing strata. The commonest host rock is the micaceous quartzite of the lower Snowshoe formation, but veins may occur in Snowshoe phyllite or Midas argillite.

78
The largest known strike vein in the map-area is the B.C. vein [4]. This vein is 2,400 feet long, as great as 42 feet wide, and has been developed over 900 feet vertically. It strikes north 45 degrees west and dips about 70 degrees northeastward. The vein cuts the schistosity of the Midas formation at a small angle. Some of the adjacent rocks are bleached in a patchy manner, especially in the hangingwall. Figure 17 shows the surface trace and its relation to the Canusa vein. At the 1500 level, 900 feet below the surface, the vein is thin and discontinuous. Three oreshoots have been mined, but the ore is reported to present problems in milling.

Replacement deposits were not found until 1944. Up to August, 1953, 42,176 tons, with an average grade of 0.548 ounce per ton of gold, had been mined, mostly since 1948. So far all important replacement orebodies have been found in the Baker limestone beds between the Sanders fault and Island Mountain mine. No extensive limestone equivalent to the 309 limestone beds of Island Mountain is known, but almost certainly there is an equivalent to the Johns limestone that remains unexplored.

The replacement orebodies are tabular, with greater continuity along the dip of strata than along the plunge of folds. They have been found to occur in groups at slightly different horizons with only minor overlap in plan. Figure 20 shows two stopes of such a group. Skerl (1948b, p. 589) suggested that these orebodies occur at compressed overturned dragfolds. This is a possibility, but the writer saw no confirmatory evidence.

The Gisco and Spitfire are two of a large group of recorded claims that once blanketed southern Antler Mountain and northwestern Nugget Mountain from Sawflat Creek to Wolf Creek. The claims were held by Canyon Cariboo Gold Mines Limited and included the Noranda, Zone, Lode, Pittman, and Norex groups in addition to the Gisco and Spitfire. All except some of the Noranda and Lode groups had lapsed or been transferred by January, 1955, when only nine claims were in good standing.

Antler Creek was one of the richest placer-gold creeks. A few large veins on Antler Creek were examined in the 1860's and 1870's but were almost barren of gold. Sporadic prospecting was done during the 1930's, but exploration was not extensive until the present company started work in 1946-47.

Rock exposure is good, along Antler Creek and parts of Wolf Creek and China Pass, but elsewhere bedrock is deeply mantled by drift. The area of the original large group of claims is underlain mostly by Snowshoe formation and in the northern part by black phyllites and argillites of the Midas formation. All the rock types of the Snowshoe formation are present—micaceous quartzite and siltstone, phyllite, and small limestone lenses. The major structure is the Snowshoe synclinorium, the axis of which crosses Antler Creek in the vicinity of Victorian Creek and is offset 2 miles northward by the Antler fault. Numerous minor folds and small dragfolds can be identified, but the complexity is such that the folds within the Snowshoe formation cannot be described in detail. Isoclinal folding is characteristic of the area, and numerous examples of isoclinal dragfolds can be seen. Within the Midas formation the crest of an anticline occurs near the confluence of Pittman Creek with Antler Creek. This is one of a series of folds rising on the southwest limb of the Cunningham anticlinorium. The major fault in the vicinity and the largest in the area, the Antler fault, passes through the claims with a northerly strike. The main fault is exposed by placer workings at the head of the China Pass pit. The trace of the main fault leaves Antler Creek at California Gulch and continues along China Pass and the valley of Sawflat Creek and Swift River. The fault has a right-hand
horizontal separation of approximately 2 miles. A number of lesser faults splay from the Antler fault in the vicinity of Pittman Creek. There are at least three subparallel minor faults and one moderate-sized fault.

The exploration work by the company was described by Holland (Minister of Mines, B.C., Ann. Repts. 1946, p. 94; 1947, pp. 114–115) and is quoted below.

The Gisco group consists of ten claims staked along the west side of Antler Creek and extending northward from Sawmill Flat. The main showing on the group, the Gisco vein, is about 50 feet above creek-level, on the west side of Antler Creek opposite the mouth of Victoria Creek. About 1,200 lineal feet of bulldozer stripping was done parallel to Antler Creek, to the north and south of the Gisco vein. The Gisco vein lies in grey flaggy quartzite that strikes north 45 degrees west and dips 75 degrees north-east. The vein-fracture strikes north 80 degrees east and dips 70 degrees north. The vein has a maximum exposed width of 12 inches and a length of about 40 feet before it pinches where the fracture crosses soft argillaceous rocks. The vein-quartz is mineralized with pyrite, galena, and rare specks of visible gold. The highest assay of a sample taken by the owners is reported to be 0.32 oz. gold per ton. A sample of picked pieces containing 15 per cent pyrite and about 5 per cent galena assayed: Gold, 0.01 oz., and silver, 1.8 oz. per ton. Several 1- to 2-inch quartz stringers lie on the foot-wall side of the vein. Ten feet on the hanging-wall side a 1- to 2-inch stringer is exposed, from which samples containing visible gold have been obtained and from whose outcrop fine flour gold may be panned.

To the north of the Gisco vein is a 25-foot limestone-bed. In it is a vein well mineralized with chalcopyrite. A selected sample of chalcopyrite assayed: Gold, 0.01 oz. per ton; silver, 10.5 oz. per ton; and copper, 26.9 per cent. No other veins were exposed.

The Spitfire group of nine located claims is on the west side of Antler Creek between Wolfe Creek and the head of California Gulch. During the summer E. S. Dowsett was engaged in prospecting these claims. He discovered a vein zone having a known length of about 900 feet and a width of about 350 feet lying 700 to 900 feet in elevation above the China Creek cabin and on the north side of Wolfe Creek. The quartz veins occur in groups of individual veins 2 to 3 feet apart. The veins are stripped for lengths of about 20 feet; the greatest exposed width of any vein is 6 inches. The veins strike north 50 degrees east, stand vertically, and cut grey flaggy quartzite striking north 45 degrees west and dipping 65 degrees north-east. The quartz is mineralized with pyrite, most of which has been leached from the outcrops. Of the numerous veins found and partly stripped, possibly one-half contain fine flour gold that may be panned from the weathered exposures.

On the Zone group, about 500 feet south-east of the Antler Creek bridge, a group of five sub-parallel veins was found on the south side of a low ridge. The veins, which strike north 25 degrees east and which cut vertically through grey thinly fissile ankeritic schist, are from 2 to 16 inches wide, and were stripped for short distances. They are very sparsely mineralized with pyrite and some arsenopyrite, and small amounts of fine gold may be panned from certain of the oxidized outcrops.

Four flat drill-holes, totalling about 400 feet, were drilled at an elevation of about 50 feet below the outcrop. These crossed narrow widths of sparsely pyritized quartz, from which the highest assay was 0.06 oz. gold per ton.

Two narrow parallel quartz veins were found on the east side of Antler Creek, 150 feet down-stream from the Gisco vein, which occurs opposite Nugget Gulch. Fine visible gold could be seen in the quartz outcrops, from which most of the pyrite mineralization had been leached. One flat drill-hole, 25 feet below the outcrop, intersected several 4- to 10-inch quartz veins, one of which, at a distance of 83 feet from the collar of the hole, assayed 0.81 oz. gold per ton.

Five holes, totalling about 200 feet, were drilled to test the downward extension of the Gisco vein. Vein quartz was intersected in two of the holes, but no core was recovered from the others.

Toward the close of the 1947 season a discovery of replacement mineralization was made on the Pittman group, near the mouth of Victoria Creek. Although some of the rock was well mineralized with galena and sphalerite, as well as pyrite, the gold and silver content is low. A picked piece containing galena, and sphalerite in abundance, assayed: Gold, trace; silver, 1.1 oz. per ton; lead, 4.9 per cent.; and zinc, 34.9 per cent.

Up to the present time all veins found on the Spitfire, Gisco, Zone, and Pittman groups have been short, narrow, and sparsely mineralized, even though gold may be panned from the oxidized vein material or fine visible gold may be seen in their oxidized outcrops. There is a considerable number of these veins clustered on both sides of a zone of limestone-beds that crosses Antler Creek just downstream from the Gisco vein. Under favourable conditions, this limestone-zone might form a locus for replacement mineralization, which, if it were gold-bearing, could be of considerable interest and economic importance. For this reason it should be worth considering as a zone for intensive prospecting.
For several years following 1947 the company employed E. S. Dowsett to continue prospecting the holdings. He panned scheelite from the overburden on many of the Zone and Spitfire claims and found some small scheelite replacements of limestone. In 1952 some bulldozer stripping was attempted on claims of the Zone group, but in general the overburden was too deep.


**Island Mountain (Aurum)**

This property consists of thirty-two Crown-granted claims and fractions extending up the southeastern slopes of Island Mountain from the shore of Jack of Clubs Lake. The mine workings are mainly on the Aurum (Lot 10517) and Aurum West (Lot 11066) in the northeastern part of the group. The property was owned by Island Mountain Mines Company Limited, a subsidiary of Newmont Mining Corporation of New York, and was bought in August, 1954, by The Cariboo Gold Quartz Mining Company Limited. The mine has been renamed the Aurum, but the name Island Mountain is retained in this bulletin.

The history of the property is given in summary by Holland (Minister of Mines, B.C., Ann. Rept., 1950, pp. 102–103) and is quoted as follows:

Gold-bearing quartz veins were found on Island Mountain in the early 1870’s, and in 1878 the Enterprise Company, a group of Barkerville miners, began exploration work on them. This company intended to haul ore to a 10-stamp mill installed in the Kurti and Lane shaft-house at the Meadows. The Island Mountain Quartz Mining and Milling Co. took over the ground in 1887, moved the mill from the Meadows to Jack of Clubs Lake (near the present mill location), and, assisted by a loan of $20,000 from the British Columbia Government, built a new mill. Several hundred tons of ore, mainly from the Johns adit, was milled in 1890, and 15 to 20 tons of pyrite concentrates was shipped to the Government Reduction Works at Barkerville for treatment.

A satisfactory recovery of gold could not be made, and the property was forfeited to the Government for non-repayment of the loan. No further work was done until 1897, when the same company leased the property from the Government, installed four vanners, and ran the mill for about a month, again unprofitably. In 1903 the late C. J. Seymour Baker tested ore from Island Mountain and cleaned out some old adits, but interest in the property again lapsed. In 1925 Baker acquired the five original Crown-granted mineral claims, later known as the Aurum group, from the Government and each year until 1932 employed a small crew clearing out the old workings. In 1932 he optioned the Aurum group of five claims to Reward Mining Company Limited, who located eight adjoining claims to the west. This company bonded the whole property to Cariboo Consolidated Gold Mines Limited, who in turn optioned their holdings to Newmont Mining Corporation of New York. Island Mountain Mines Company Limited was incorporated by that corporation to operate the property.

About 1,000 feet of underground work was done during early exploration. Although several hundred tons of ore was milled, there is no record of the amount of gold produced. Production by Island Mountain Mines Company began in November, 1934, with a 50-ton mill. The mill capacity was increased to 100 tons per day in 1935, and production has been continuous to the present.

To the end of 1953 the mine produced 740,525 tons of ore, from which 320,792 ounces of gold and 46,502 ounces of silver were recovered, yielding $12,065,682. In August, 1954, the mine and property, excluding the mill and some buildings, were sold to The Cariboo Gold Quartz Mining Company Limited for $300,000. The 1954 production up to the date of sale amounted to 30,584 tons, from which approximately 13,000 ounces of gold and 1,400 ounces of silver were recovered. Dividends declared total $1,517,283. Island Mountain Mines Company Limited is in process of voluntary liquidation and the estimated assets of the company total $911,000.*

The mine workings are extensive, totalling more than 20 miles. The portal of the main haulage adit (4000 level) is situated near the northeast corner of the Aurum claim and approximately 80 feet above Jack of Clubs Lake. From this level, 1,500 feet from the portal, a vertical three-compartment shaft provides access to the eleven deeper levels. The interval between levels is 125 feet down to the 3000 level and thence 150 feet to the lowest level (2550). From the shaft stations the main development extends to the

---

* Initial liquidating payments of 85 cents per share were paid up to November 30th, 1955.
northwest and southeast, approximately parallel to the regional strike. Above the main haulage level are several old adits, of which the Mid Lake (4230) is much the longest. Shorter ones include the Upper Lake (4350), Lower Johns (4480), and the Upper Johns (4510).

The mine workings are almost entirely within the Snowshoe formation but are also in the Midas formation. Most of the workings are restricted to a relatively thin stratigraphic section of the Snowshoe formation.

The detailed stratigraphy cannot be outlined with certainty because the structure is not known in detail. The problems are treated in the discussion of the geology of the Wells camp on page 53 and will be only briefly reviewed. Figure 12 portrays diagrammatically the interpretations of the stratigraphy and structure at Island Mountain according to (a) Hanson, (b) Benedict, and (c) the writer. The sections are shown looking northwest at the shaft. The writer recognizes an attenuated isoclinal syncline at Island Mountain mine, and names it the Sanders syncline.

The following table presents in simplified form the sequences of rocks encountered from the base of the Snowshoe formation toward the northeast, without regard to possible duplication by folding:

<table>
<thead>
<tr>
<th>Regional Unit</th>
<th>Lithology</th>
<th>Approximate Thickness in Feet</th>
<th>Mine Nomenclature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midas formation</td>
<td>Black or bleached argillite or phyllite.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Both Midas and Snowshoe rocks have been bleached locally. Midas phyllites bleached to biscuit colour are present on the lowest level of the mine. Their origin is betrayed by penetration of bleaching along foliation and AC joints and by ragged kernels of unbleached rocks within bleached ones. Snowshoe phyllites and quartzites have locally been bleached, and possibly much of the Baker limestone beds and associated phyllites have been recrystallized and bleached. Locally the quartzites have been silicified. Other alterations are rare.

The stratigraphy at Island Mountain mine may be compared with that at the Cariboo Gold Quartz mine. The section between Midas formation and Baker limestone is thinner in the Cariboo Gold Quartz mine. Bleached rocks and the phyllite with quartzite lenticles are sparingly present in Island Mountain mine. The greatest difference is in the amount and type of limestones. In the Cariboo Gold Quartz mine the Baker limestone may be dark grey and argillaceous, and there is essentially no equivalent of the 309 limestone of Island Mountain mine although about a foot of limestone is found in the 201 crosscut.

The main fold structures of the mine consist of the Sanders syncline and the mine dragfold (see Figs. 8 and 12). The Sanders syncline cannot be directly observed but is the simplest interpretation of the known facts. All folds plunge northwestward at an average of 22 degrees. On the surface near the northwestern boundary of the property the plunge is reduced to 2 to 5 degrees northwestward.

The Sanders syncline lies between the mine dragfold and the Island Mountain anticlinorium. The dragfold shows that the Baker limestone beds are overturned and lie between a syncline to the southwest and an anticline to the northeast. The Midas formation is right side up on the northeastern flank of the Island Mountain anticlinorium and, therefore, a syncline must exist between it and the dragfold. The next anticline northeast of the mine dragfold is small compared to the Island Mountain anticlinorium and no Midas rocks outcrop at the surface. The syncline and anticline are part of a series of folds between the Island Mountain anticlinorium and the Snowshoe synclinorium.

Figure 21 shows the mine dragfold on the 3500 level, outlined by Baker limestone beds. The dragfold has a wave-length of about 400 feet. The pure limestone is found in large lenticles that are not features of original deposition. The limestone has flowed, been pulled apart, and been torn by small faults. Although discontinuous, the limestone and phyllite together clearly trace the outline of the dragfold. In contrast, structures are obscure in the micaceous quartzites, as Figure 21 shows. In these rocks there is no indication of the position of the synclinal axis of the dragfold and no evidence of closure.

Minor folds are very numerous. Where outlined by limestone they are readily apparent, but in adjacent micaceous quartzite the folds may not even be recognizable (see Plate VIII (B)). In the central limb of the mine dragfold some minor folds are recumbent. Such folds have not been observed elsewhere in the area.

The major faults in the mine are the Aurum and Jack of Clubs. The Mosquito Creek fault cuts through the property but is not exposed in the mine. Benedict (1945, p. 762) described the Aurum fault as follows:

Over much of its underground exposure it strikes N. 20° to 30° W. and dips about 40° to the east. It is relatively regular. Its displacement is variable. At one point, the hanging-wall has moved S. 59° E., a distance of which the horizontal component is 475 feet and the vertical component is 240 feet down. In plan it offsets to the right, though, due to folding of the rocks, this is not very obvious. The writer believes it carries both pre- and post-mineral movement, and that considerable ore quartz was deposited along it.

In the lower levels of the mine the Aurum fault flattens, is narrower, and has less movement. The strike of the Aurum fault is slightly different from that of most major faults in the map-area, but the resultant movement, described by Benedict, trends south 59 degrees east, and hence is little different from that of most faults striking north 10 to 20 degrees east.
Figure 21

PART OF 3500 LEVEL-ISLAND MOUNTAIN MINE

Showing major dragfold plunging northwestward at approximately 22°

NOTE: Structural information in the quartzites is obscure or misleading
The property is adjacent to the richest placer stream of the district and was prospected for lode as early as 1864 by Wilkinson, who found the Proserpine vein. Prospect shafts were sunk in several strike veins, including the Proserpine and Steadman. Activity lapsed until 1906, when C. J. S. Baker started prospecting in the vicinity and located the central claims of the group. Little was done from 1914 until 1933, when Newmont Mining Corporation drove a shallow adit 975 feet on the Proserpine South (Lot 431). The group has since received little attention.

The claims are underlain by rocks of the Snowshoe and Midas formations. The Midas formation underlies the Pani South (Lot 10591), and most of the North Star (Lot 10593), Pani (Lot 10590), San Juan (Lot 414), and San Juan Extension (Lot 10592). The Midas formation is chiefly black argillite and metasiltstone with lesser amounts of phyllite or bleached argillite. Exposures in the placer pit on Mink Gulch show patchiness and gradation of bleached and unaltered rocks. The Snowshoe formation is very poorly exposed and can only be seen along the road to the Warspite adit and in some surface stripping. The formation is composed of grey micaceous quartzite, siltstone, and phyllite, with lesser amounts of brown phyllite and minor limestone.

The Midas formation is exposed from one contact with the Snowshoe formation along Williams Creek and Mink Gulch to the other Snowshoe contact near Walker Gulch in a series of overturned folds which are part of the Island Mountain anticlinorium. The folds along Williams Creek are sharp and attenuated, whereas those on upper Mink Gulch are on the crest of the anticlinorium and are less sharp and of smaller amplitude. The combination of topography and complex overturned folds lends the trace of the contact with the Snowshoe formation a complicated yet nearly flat-lying form. For additional details of the fold structures at either side of the Island Mountain anticlinorium in the vicinity see "Westport" and "Richfield." Because of a dearth of outcrop, little can be seen of the folding within the Snowshoe formation. The chief fault within the property is the Barkerville (described on pp. 56 and 92). Several other northerly striking faults are known but are too small to be shown on Figure 2.

The Proserpine is the most prominent vein, a strike vein that can be traced from the Wilkinson (Lot 177) several hundred feet southeast to the Proserpine (Lot 430). It appears to be nearly barren. A number of transverse and diagonal veins have been exposed by surface stripping, and some are well mineralized with pyrite. The adit on the Proserpine South claim was not examined by the writer. Hanson (1935, p. 31) described it as follows:

In 1933 Island Mountain Mines Company, Limited, drove a crosscut adit from the Proserpine South claim eastward under this group of surface openings. The adit is 975 feet long. It is a crosscut to the east for 600 feet and from the end of the crosscut is mainly drift to the north-northeast under the north-western part of the surface openings. The easterly drive cut a few small bed veins. The northerly drive disclosed one quartz-pyrite vein at least 6 feet wide striking north 30 degrees east and branch veins 2 feet or less in width also mineralized with pyrite. This vein is disturbed by a fault roughly parallel to it, but appears to pinch to the north to several branching quartz-pyrite veins each 1 foot or less wide that strike north 20 to 30 degrees east and end at an easterly striking fault near the north end of the workings. This vein has been drifted on for 140 feet.

[References: Johnston and Uglow, 1926, pp. 195–201; Hanson, 1935, pp. 31–32; Minister of Mines, B.C., Ann. Rept., 1914, p. 66.]

Richfield

The Richfield property was explored during 1933–34 by Richfield Cariboo Gold Mines Limited, which was dissolved in 1948. The claims have lapsed. The Richfield adit at the head of Mink Gulch is driven into the base of the northern spur of Bald Mountain at approximately 5,055 feet elevation. The adit is 2,810 feet long, being driven 600 feet from the portal south 52 degrees east, then 1,950 feet due south, and finally 260 feet averaging south 55 degrees west. The adit was driven to intersect the downward projection of a group of veins exposed on the northern slope of Bald Mountain at approximately 5,700 feet elevation. The surface showings consist of numerous moderately large
diagonal and strike veins, all of which are relatively barren of sulphide minerals or solution cavities.

The country rock at the surface showings and extending downward almost to the adit is grey micaceous quartzite of the Snowshoe formation, but the adit is driven entirely in the uppermost part of the Midas formation. Most of the rock in the adit is dense black argillite, but there are some zones of bleaching and some of intense ankeritic alteration. The ankeritic alteration where most intense completely changes the appearance of the rock, so that at first glance it looks igneous.

Only a relatively thin stratigraphic section is exposed because the beds dip gently and are repeated by minor folding. With rare exceptions the folds plunge 10 to 15 degrees northwestward. It is possible that a fault occurs near the portal, because the outer 150 feet of the adit is heavily timbered, but in the remainder there are only very minor faults. A number of small veins occur that are parallel with bedding, but there are also a few 8-inch-wide diagonal veins dipping steeply northward at about 800 feet from the portal. A sample of a bedded quartz vein 1,050 feet from the portal assayed nil in gold and silver.


The Shamrock property, including the former Shamrock and Myrtle groups, consists of nineteen Crown-granted claims and fractions on Barkerville Mountain, chiefly north and west of the village. It is owned by Island Mountain Mining Company Limited and was not included in the sale in 1954 to Cariboo Gold Quartz Mining Company Limited. The group is bounded by property of Cariboo Gold Quartz Mining Company Limited and Williams Creek Gold Quartz Mining Company Limited. The only major underground working is the Shamrock adit, driven west for more than a mile from the portal on the outskirts of Barkerville.

The area is largely mantled by drift, and few, if any, veins were found prior to the intensive prospecting by E. E. Armstrong on the Myrtle group in the early 1920's. In 1924 Armstrong milled the oxidized portions of veins discovered by him. In 1933 Newmont Mining Corporation did some stripping on the Myrtle group and Shamrock Gold Mines Limited drove the Shamrock adit 1,800 feet toward the downward projection of some veins on the surface of that group. In 1941 Island Mountain Mines Company Limited purchased the Myrtle and that part of the Shamrock group which included the adit, and in 1941-42 drove the adit to the Martha (Lot 10508) and Cariboo (Lot 10512) claims, over a mile from the portal.

The property is underlain chiefly by the Snowshoe formation, and only near the southwestern boundary of the Myrtle and Marie claims does the Midas formation outcrop. The Snowshoe formation includes grey micaceous quartzite, particularly near the base, and much micaceous siltstone and phyllite, and moderate amounts of limestone near the portal of the adit. The black argillites of the Midas formation outcrop on the northeastern limb of the small anticline, the southwestern limb of which contains the B.C. vein. Northeast from the anticline of Midas rocks there is a series of folds culminating in the Snowshoe synclinorium, the axis of which is northeast of the Shamrock adit. The major faults are the Sirius and Barkerville faults (see pp. 56 and 92). The Sirius fault crosses the Shamrock adit close to the Sirius claim.

The surface showings on these three claims appear as encouraging as any on the Cariboo Gold Quartz or Island Mountain properties. A large number of transverse and some diagonal and strike veins were uncovered on the three claims by E. E. Armstrong in 1920–24. The values obtained in the oxidized portions of these veins were encouraging, and below the oxidized zone the veins were reported to be highly pyritiferous.

The Shamrock adit was inaccessible and could not be examined by the writer. The adit was driven toward the Martha (Lot 10508), Marie (Lot 10502), and Myrtle (Lot
10501) claims but did not reach the latter two. Many transverse veinlets were encountered on the southwest side of the Martha claim.


The Warspite (Lot 9560), Hard Cash (Lot 9564), and Independence (Lot 9563) are three of the most important of a group of forty-one Crown-granted claims and fractions on southeastern Mount Proserpine and northwestern Antler Mountain. The property is owned by Proserpine Mines Limited, which is controlled by Pioneer Gold Mines of B.C. Limited through Barkerville Mining Company Limited. Mount Proserpine was one of the localities first prospected, but little was done on the area of the present property except the exploration of some veins at the head of Grouse Creek, where several small adits were driven. The first intensive work was done by E. E. Armstrong, who located the Independence in 1916 and other claims to the southeast thereafter. In 1917 Tregillus, Blair, and Carey located the Kitchener (Lot 10558), Warspite, and other claims covering the ground between the Proserpine group and the Independence. Both groups of claims were optioned in 1919 by Mining Corporation of Canada Limited, which did some exploratory work but dropped the options the following year. Only minor work was done until 1935, when the same claims were optioned by the Proserpine Syndicate, directed by W. R. Wilson and Sons. Small adits were driven on the Warspite and Independence claims. In the same year Premier Gold Mining Company Limited did some surface stripping on claims on Antler Mountain which are now part of the group. In 1934 the Proserpine Syndicate incorporated as Proserpine Gold Mines Limited and did more surface and underground work, particularly in the Bell and Newberry adits on the Independence claim. In 1939 the company drove an adit more than 1,000 feet long on the Hard Cash claim from Grouse Creek. In 1940 Privateer Mine Limited optioned the Proserpine Gold Mines Limited holdings and did 36,000 feet of bulldozer and hand stripping, and some underground work in the Warspite adit. In 1945 Proserpine Mines Limited succeeded the former company, and twenty-one claims (Rex, Elsie, and Hen groups) were recorded northeast of the Crown-granted claims. In 1945–46 approximately 54,000 linear feet of bulldozer stripping and road-building, 900 feet of drifting in the Warspite adit, and 1,700 feet of diamond drilling were done. No work has been done since, and most of the recorded claims have lapsed.

The main underground workings are the Warspite [11], Hard Cash [13], and Bell and Newberry [12] adits, the last two being on the Independence claim. With the exception of the Hard Cash, the adits are situated on the upland slopes of Mount Proserpine and intersect earlier shallow prospect shafts. The Warspite adit has about 1,400 feet of workings, the Hard Cash 1,025 feet, the Bell 700 feet, and the Newberry 600 feet. A branch from the Cariboo Hudson road at Conklin Gulch leads to the Warspite adit, whence bulldozed strips lead to the other two adits on Mount Proserpine. A road leads up Grouse Creek from the Hudson road to the Hard Cash adit, but the last three-quarters of a mile is impassable by car.

The property is underlain dominantly by the Snowshoe formation, including grey micaceous quartzite and phyllite with lesser amounts of brown or green phyllite and minor limestone lenses. There is slightly less micaceous quartzite than is common in the lower part of the Snowshoe formation. At the head of Grouse Creek a phyllite with quartzite lenticles similar to that described in the Cariboo Gold Quartz mine indicates intense deformation, probably by extensive thinning and pulling apart of beds. The Midas formation outcrops along the southwestern boundary of the property. A number of Proserpine acidic dykes occur and several zones of silification.

Fold structures are not clear in detail. Many minor folds are clearly recognizable but only one large fold, the Island Mountain anticlinorium. Midas formation outcropping
in the southwestern part of the property forms part of the northeastern flank of this structure. On the property all folds plunge northwestward from 5 to 15 degrees.

Mount Proserpine lies between two major northerly striking faults, the Barkerville fault on the west and the Grouse Creek fault on the east. The Barkerville fault is discussed on pages 56 and 92. The Grouse Creek fault in the vicinity of the claims follows the deep cleft of Grouse Creek. The fault undoubtedly dips steeply eastward and has been subject to normal movement, which has produced a right-hand horizontal separation of approximately 800 feet. When the trenches were fresh, C. E. G. Brown, geologist for Proserpine Mines Limited, mapped many small faults, mostly northerly striking ones. These faults are too small to indicate on Figure 2. Several small faults are seen in the adits. One slip in the Warspite adit strikes subparallel with the bedding but dips more steeply.

Veins on Mount Proserpine are described in some detail by Johnston and Uglow (1926, pp. 195-205). The great amount of bulldozer stripping carried out since then has uncovered very few veins that were not known previously. Veins of all types common in the district occur on Mount Proserpine, the larger ones being strike veins. The veins contain more galena than is common in the area, but not in amounts to make the veins of interest as a source of lead. The galena is not argentiferous. The Warspite adit [11] is near the north corner of the Warspite claim at approximately 5,525 feet elevation. The adit crosscuts the strata at north 51 degrees east for 120 feet, and then turns southeastward and follows the strata at an average of south 53 degrees east for over 1,000 feet. A branch 320 feet from the portal follows a silicified zone for 150 feet to the east. A shaft 34 feet deep is intersected by the drift 160 feet from the portal. The workings expose about 200 to 300 feet of strata, of which the northeastern part is largely micaceous quartzite with interbedded phyllite and the southwestern part largely phyllite. Foliation strikes on the average north 57 degrees west and dips 60 to 80 degrees northeastward. The bedding, where it can be distinguished, is parallel to the cleavage.

There are two major strike veins and, particularly in the first 500 feet of workings, numerous small transverse veins and veinlets. The most interesting vein, well mineralized with pyrite, is a strike vein exposed in the shaft, crosscut, and drift. It is 130 feet long and averages about 1 foot wide. It strikes north 60 degrees west and dips 60 degrees northeastward. The other strike vein occupies a small fault which is subparallel with bedding and which, where quartz-filled, strikes north 34 degrees west. This vein is first seen in the drift 470 feet from the portal and continues for 120 feet. It is 1 to 3½ feet wide. The vein is locally well mineralized with pyrite. Two samples taken at average parts of the vein assayed as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Width</th>
<th>Gold</th>
<th>Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 525 feet from portal</td>
<td>2</td>
<td>0.1</td>
<td>Nil</td>
</tr>
<tr>
<td>2. 590 feet from portal</td>
<td>3½</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

A zone of silicified and bleached quartzite 30 to 40 feet wide and subparallel to the schistosity is encountered by the drift and followed by a branch. The zone has been traced by drilling for 400 feet. Small transverse veinlets occupy the AC joints within the zone of alteration and are very numerous and commonly pyritiferous. The altered rock itself has some pyrite in it. A selected sample of the altered rock from drill core assayed: Gold, 0.10 ounce per ton. A sample across a well-mineralized transverse vein 8 inches wide 395 feet from the portal assayed: Gold, 0.67 ounce per ton.

The Bell and Newberry adits [12] on the Independence claim could not be examined because the portals were caved and ice-filled. The Bell adit is reported to be 700 feet long in a southwesterly direction. Hanson (1935, pp. 32-33) reported the adit intersects
two 8-foot-wide strike veins which are both well mineralized, and picked samples of pyrite from them reportedly assayed 4 ounces of gold per ton. The portal of the Newberry adit is near the boundary of the Hard Cash claim. The adit is 600 feet long and, according to Hanson (1935, p. 33), "it cuts two quartzose zones, each about 30 feet wide, of bed vein type, locally well mineralized with pyrite."

The Hard Cash adit [13] is driven westward from the bank of Grouse Creek at approximately 4,850 feet elevation for over 1,000 feet through grey micaceous quartzites and phyllites and one silicified and bleached zone 80 feet wide. Apart from two small diagonal veins near the face, the only veins are near the portal, where there is an irregular group of transverse and diagonal veins sparsely mineralized with pyrite and galena. A sample across a narrow diagonal vein 8 inches wide, 50 feet from the portal, assayed: Nil in gold and silver.


The Westport group comprises twenty-eight claims and fractions at the confluence of Stouts Gulch and Williams Creek. It includes four of the oldest lode claims in British Columbia—the Black Jack (Lot 1B), Wintrip (Lot 32F), Homestake (Lot 4n), and Cornish (Lot 1F). Other claims in the group which have been described separately in earlier reports are the Morning Star (Lot 10504), Evening Star (Lot 10505), Sirius (Lot 10506), Westport (Lot 10468), Diller (Lot 10503), Black Jack Extension (Lot 10469), and Mammoth (Lot 10472). The property is now held by Williams Creek Gold Quartz Mining Company Limited, which company is owned principally by The Cariboo Gold Quartz Mining Company Limited, Noranda Mines Limited, and Consolidated Quebec Gold Mining and Metals Corporation.

The Westport group includes within it much of the richest placer ground on Williams Creek. Not unnaturally, this was one of the first places prospected for lode deposits, and the Black Jack claim, in particular, has been repeatedly examined since the late 1860's. The chief development on the Black Jack was from 1887 to 1892. During this period a shaft was sunk 120 feet, from which three levels were established with a total of a few hundred feet of drifts and crosscuts. In this period $5,000 to $7,000 in gold was recovered from approximately 300 tons of ore. It was reported that assays of $70 per ton and greater had been obtained from the ore, but milling practice was so primitive that the recovery was of the order of $17 to $23 per ton. The high assays were probably from enriched oxidized upper portions of the vein. Activity lapsed until the 1930's, when the Aladdin-Honest John and Dooley-Home Rule showings on the present Morning Star and Evening Star claims were prospected. In 1933 Britannia Mining and Smelting Co. Limited took options on many of the claims now in the Westport group. This company drove three prospect adits—one each on the Black Jack [9], Westport [7], and Wintrip [8] claims—but dropped the options in 1934. The Cariboo Gold Quartz Mining Company Limited acquired the group in 1938, and in 1946 turned it over to Williams Creek Gold Quartz Mining Company Limited. The present owners rigorously explored the group by geological survey, stripping, and diamond drilling. Approximately 15,000 feet of drilling was done, mostly in the vicinity of the Westport and Black Jack adits, and 10,000 feet of bulldozer stripping was done, mostly on the Morning Star claim. The company has been inactive since 1947.

The Westport group is underlain almost entirely by the Snowshoe formation, only part of the Pilot (Lot 10473) and Morning Star claims being underlain by Midas formation. The Snowshoe formation consists typically of grey micaceous quartzites and interbedded phyllites but includes brown and green phyllites and limestone beds, particularly in the northeastern part of the property.
Fold structures are complicated. The axis of a moderate-sized anticline crosses Williams Creek approximately 1,200 feet southeast of the confluence with Stouts Gulch. This anticline is probably the continuation of the one in which the B.C. shaft is located. A syncline occurs between this structure and the outcrop of Midas formation farther up Williams Creek. The Midas rocks form the northeastern flank of the Island Mountain anticlinorium. All structures are complicated by much dragfolding.

Two major northerly striking faults cross the Westport group. The western fault, the Sirius, crosses the Shamrock adit near the northern corner of the Sirius claim, and a branch of it appears in the Wintrip adit. The fault strikes from north to north 20 degrees east and apparently dips steeply eastward. It appears to be essentially a normal fault, and its right-hand horizontal separation of approximately 800 feet shows it to be a large one. The eastern fault, the Barkerville, is shown on Hanson’s map (1935) striking northeastward along Williams Creek at Barkerville. The writer considers that the fault is farther to the east and has a more northerly strike (see Fig. 2). Possibly a small branch splays from it in the vicinity of Conklin Gulch and continues up Williams Creek. The main fault is exposed on Williams Creek just above Mink Gulch, and an important branch of it was uncovered in J. J. Gunn’s hydraulic pit near Conklin Gulch. The fault strikes from north to north 10 degrees east, dips steeply eastward, and is essentially a normal fault. It has an apparent right-hand separation of more than 1,000 feet. There are a number of lesser faults, of which the bedded Westport fault is the most important. It is exposed at the face of the Westport adit, where it strikes north 65 degrees west and dips 40 degrees northeastward. Skerl (1948a, p. 42–43) believes the Westport fault is important economically because auriferous veins seem more numerous in the hangingwall. He believes that its intersection with the Barkerville fault would be a particularly favourable area to prospect.

The underground workings consist of the Westport [7], the Wintrip [8], and the Black Jack adit [9], each named for the claim on which it is. The Wintrip adit is on the south bank of Stouts Gulch, 1,200 feet from the confluence with Williams Creek, and contains about 320 feet of workings. The adit exposes many veins and veinlets, most of which are transverse. The largest vein is followed for 80 feet. Skerl (1948a, p. 42) states:—

\[
\text{(this vein has an ore-shoot 60 feet long) averaging 0.25 oz. (of gold) over 3 ft. A drill hole cut this vein at 55 feet below the surface where it assayed 0.16 oz. over 4.5 ft. In another drill hole at about the same elevation and 100 ft. to the east another vein not known at the surface gave 2.85 oz. over 2.0 ft.}
\]

Slough from the walls has backed up water so that the adit is difficult to examine at present.

The Westport adit is in the west wall of the small canyon on Williams Creek 400 feet above the confluence of Stouts Gulch. There are about 260 feet of workings, including two drifts on transverse veins. Skerl (1948a, p. 43) states:—

\[
\text{(the northwestern vein) averaged 0.37 oz. over 1.0 ft. for 36 ft. Diamond drilling from the surface has disclosed that there is a persistent transverse vein about 160 ft. northwest of the last mentioned vein and on the hanging wall of the Westport bedded fault. Five different holes gave the following intersections, over a vertical range of 70 to 300 ft. below the surface on this vein: 0.2 ft., 0.10 oz.; 0.4 ft., 0.35 oz.; 1.0 ft., 0.42 oz.; 1.5 ft., 0.8 oz.; 1.75 ft., 0.9 oz.; 1.9 ft., 0.4 oz.; 0.8 ft., 1.77 oz.; and 7.5 ft., Tv. True widths are probably 75 per cent of those given.}
\]

The Black Jack adit is on the east bank of Williams Creek near the confluence with Stouts Gulch, and has about 160 feet of workings. The portal is adjacent to the caved shaft of the original Black Jack mine. The adit shows numerous veinlets, most of which are transverse. These are most dense near the portal, just inside the adit and on the walls of the small surface cut. Some contain considerable pyrite. The largest vein in the surface cut is 1 foot wide and assayed: Gold, 1.10 oz. per ton. Skerl (1948a, p. 43) states that diamond-drill cores of a transverse vein below this site assayed:—

\[
0.36 oz. over a true width of 6 ft. in one hole at 320 ft. below the surface and 0.58 oz. over a true width of 9 ft. in another hole 100 ft. to the southwest at 250 ft. below the surface.
\]
Surface stripping revealed some comparable veins on the Morning Star claim, but diamond drilling beneath the showings was not encouraging.